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Article

Environmental challenges in recreation and hospitality services of SPA centers

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Abstract: As it is revealed in the literature, there is an intense energy consumption in "Selus Per Aqua" (SPA) centers. Especially electricity and natural gas used for heating, cooling and lighting have very serious negative environmental effects. In particular, meeting these energy sources from fossil fuels and supplying water consumption from clean water sources pose a threat to sustainable environmental targets. In this context, the aim of the research is to calculate the carbon footprint based on energy consumption in 20 SPA centers located in different cities in Turkey and Lithuania. Electricity, natural gas and water consumption amounts consumed during 2022 in 20 SPA centers located in different cities in Turkey and Lithuania were used as a data set. Using the calculation methodology (Tier 1 method) put forward by The Intergovernmental Panel on Climate Change, the carbon dioxide emission amount (carbon footprint) of the SPA facilities was calculated. While the annual total carbon footprint of 20 SPA centers in Turkey and Lithuania is calculated as 6.092805 kgCO_2eq, the carbon footprint calculated for Turkey is 2.947006 kgCO_2eq. The carbon footprint calculated for Lithuania is 3.145079 kgCO_2eq. SPA centers, where health, tourism and recreation services are offered together, are centers where human mobility and energy use are inevitable due to their year-round use potential. Research findings suggest that SPA centers cause negative environmental consequences due to energy and water consumption. It is very important to prefer clean energy sources for sustainable environment, health, tourism and recreation and to avoid using clean water resources.

Keywords: carbon footprint; environment; SPA; tourism; hospitality

1. Introduction

Sustainable environmental studies are followed with interest by scientists, politicians, social institutions and working groups involving different sectors. Environmental impacts, which are basically based on human activities, are monitored and evaluated by different groups by using different indicators (Cucek et al., 2012). Because processes such as high energy consumption and uncontrolled use of natural resources in all commercial sectors, including tourism, accommodation, recreation sectors and global production, contribute to the problem of environmental pollution (Işık, 2010, 2013; Işık et al., 2018). The relationship between environmental problems and sustainability, energy consumption and tourism are frequently discussed (Farooq et al., 2023). Especially, over-reliance on fossil fuels further increases the negative effects of tourism on the environment and contributes to excessive greenhouse gas emissions (Doğru et al., 2020).

Nowadays, residential areas are associated with environmental problems such as heavy traffic, noise and air pollution, carbon and greenhouse gas emissions. Looking at the last thirty years, it can be said that carbon dioxide emissions due to carbon and greenhouse gases have increased considerably and social concern about this issue has gained momentum (Işık et al., 2017).

Therefore, solution-oriented strategies have been developed to address increasing environmental concerns, and mitigating negative environmental impacts and thus combating climate change has become a priority issue (Lombardi et al., 2016). It is seen that the green economy model is becoming increasingly widespread in order to eliminate or reduce risks such as climate change, depletion of natural resources, and natural disasters on a global scale (Bulut et al., 2023). Due to, a country's efforts to develop by taking into account environmental factors and elements can increase the welfare level of the next generation (Işık et al., 2024). The relationship between increasing the welfare levels of societies and economic growth is obvious. One of the main indicators of economic bending is energy consumption habits. It is especially important for policy makers to develop successful investment strategies and effective regulations on environmental issues (Işık et al., 2017).

In terms of its financial potential and employment opportunities, the tourism sector is one of the most important sectors globally and especially in Europe (Lagioia et al., 2024). The areas where social activities are most intense are tourism mobility and recreation activities. Due to the high demand and participation in recreational activities, especially in tourism, carbon dioxide emissions, which can have great effects on the ecosystem, are increasing and the carbon footprint is growing (Atalay, 2021). Environmental awareness and transformation efforts within the tourism sector represent a very challenging process. The classic business cycle is among the main reasons for this situation. This situation is recognized as an obstacle for sustainable development and environmental goals (Bux et al., 2022).

Searches for the protection of health and the development of healthy life alternatives are increasing day by day. In this context, the interest in healthy life alternatives and healthy holidays is increasing (Damijanić, 2019; Lehto and Lehto, 2019). While healthy recreation and vacation options affect people's mental and physical well-being, they are closely related to preventing diseases, eliminating daily stress, improving mental and psychological balance, and hedonism, especially through wellness services (Loureiro and Sarmento, 2019). These health tourism activities, which have become increasingly widespread in recent years, directly affect and improve the mental, social and physical health of individuals, while also contributing to social and cultural development. Today, as a health tourism and alternative recreation service, 'Selus Per Aqua' (SPA) are facilities that serve people's need to be healthy in every aspect (Rodrigues et al., 2019; Smith and Puczkó, 2018).

Today, the popularity of SPA centers has increased as well as tourism activities developing around the understanding of healthy life, and it has become increasingly widespread even among young people (Aluculesei et al., 2021). SPA, which has a certain culture especially in European countries, is a tourism activity where health and entertainment are together. SPA centers, which have an important effect on individuals to stay healthy, also mediate the improvement of social welfare (Chen et al., 2018). With the change and development of individual and social perception of health, the

demand for SPA centers has also increased (Dimitrovski and Todorovic, 2015). Although the concept of health tourism is a very old concept and has a recreational nature, its popularity has gradually increased especially in the last 30 years and a rapid acceleration in demand has been observed. With the increase in the pace of human life, the understanding of being healthy has developed and has become an important alternative in the fight against stress, which is the most important problem of modern societies. Therefore, meeting the increasing demand has gradually increased the importance of SPA centers within health tourism (Csirmaz and Pető, 2015).

SPA centers, which are an alternative to mental and physical health, contribute to the well-being of people. However, these centers are facilities that cause intense energy consumption due to the content of the services they offer. As stated above, SPAs and pools, which have been in high demand recently, primarily contribute to a high and intense daily energy consumption (Kavousian et al., 2013). There is a high need for energy in SPAs, especially due to heating and lighting, and considering the environmental dimension, it is worrying that this need is met every day throughout the year (Huebner et al., 2016). Due to the nature of the services offered at hotels and independently operated SPA centers every day of the week, there is an intense and significant correlation between electricity and natural gas consumption and environmental impacts. There is a high consumption due to the intense energy need here. This situation is increasing the carbon footprint (Roth and Rajagopal, 2018).

Depending on human activity and participation, it is possible to separate the carbon footprint of SPA centers as corporate and personal. When climate change and environmental problems are closely examined, it can be seen that people's attitudes and behaviors are extremely decisive (Balteanu and Dogaru, 2011). At this point, it can be said that there are environmental degradation and changes in all areas of vital activity due to human behavior and the human factor is an important threat to environmental sustainability (Keleş, 2015). While the carbon footprint is formed depending on the services offered and produced institutionally. The use of these products and services by people is another part of the carbon footprint problem. The resulting carbon footprint process for SPA centers is presented **Figure 1** below.

Today, electricity and natural gas used in SPAs are mostly met from fossil fuel sources. These fossil fuel sources are considered to be the largest carbon footprint sources and are stated as the main cause of global warming (Bello et al., 2018). The most important cause of climate change especially in recent years, is the carbon footprint caused by fossil fuels (Stern and Strent, 2017). It is known that the energy used in SPA centers is also met from fossil fuels. And as stated above, there is an intense energy consumption due to the nature of the services offered. This energy consumption constantly increases the carbon footprint of SPA centers and continues to be a part of the global climate problem. Increasing carbon and greenhouse gas emissions are the main cause of global warming and almost one third of these emissions are due to fossil fuel consumption. In particular, energy consumption (electricity and natural gas) are the main actors (World Nuclear Association, 2014).

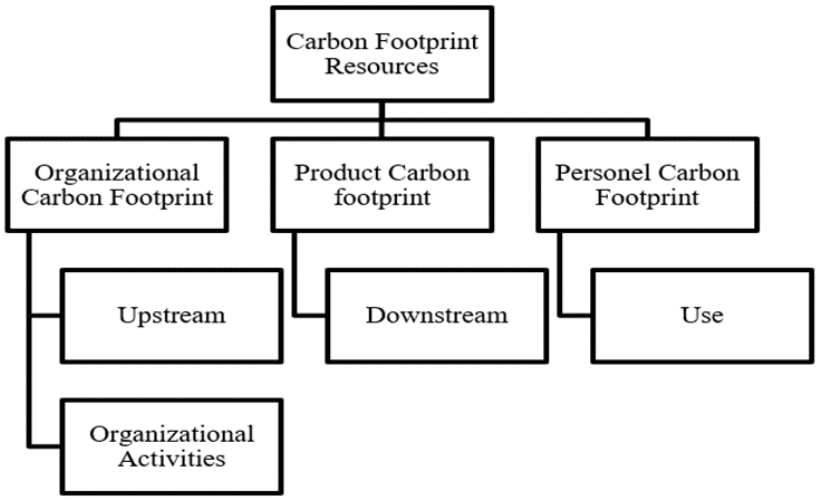

Figure 1. Carbon footprint sources (Gao et al., 2014).

Intensive energy consumption and the fact that this energy need is met from fossil resources is the primary reason for the carbon footprint of SPAs and an important part of the global climate problem. In addition, since they have an intensive service process, SPA centers can be considered as an important threat to the rights of a clean and safe environment. A large part of the carbon dioxide emission that causes the greenhouse effect is due to the use of fossil fuels in intense energy production and consumption (Çoban and Şahbaz Kılınç, 2016).

Purpose of the research: As it is revealed in the literature, there is an intense energy consumption in SPA centers. It is known that this energy need is met especially from fossil resources. Especially electricity and natural gas used for heating, cooling and lighting have very serious negative environmental effects. In particular, meeting these energy sources from fossil fuels and supplying water consumption from clean water sources pose a threat to sustainable environmental targets. In this context, the aim of the research is to calculate the carbon footprint based on energy consumption in 20 SPA centers located in different cities in Turkey and Lithuania. In line with this purpose, an answer was sought in the research question below.

What is the carbon footprint of SPA centers in different cities in Lithuania and Turkey, depending on energy consumption?

2. Background

2.1. Concept of carbon footprint

Environmental footprints describe the environmental impact of a product or service. Carbon footprint, water footprint, nitrogen footprint and energy footprint indicators are all referred to as environmental footprint (Matuštík and Kočí, 2021). Carbon footprint is one of the most important extensions of ecological footprint and a common definition of carbon footprint has not yet been established in the literature (Shi and Yin, 2021). Cheng and Liang (2021) define carbon footprint as a greenhouse gas produced by human activities or products throughout the life cycle; Rizan et al. (2020) define carbon footprint as a measure that estimates the direct and indirect carbon dioxide emissions associated with a sector, process or product; Chen et al.

(2021) is a professional term widely used in the public domain to deal with the threat posed by climate change; according to the Kyoto Protocol, it is defined as the total amount of carbon dioxide equivalent and other greenhouse gases from the life cycle of the product, including use and disposal (Karwacka et al., 2020).

The definitions above reveal the relationship between human behavior and carbon footprint. Therefore, it is understood that the behaviors exhibited by each individual in individual and social life leave a trace on the environment and this trace is accepted as a measure of damage (Bekiroğlu, 2023). Increasing concern about carbon footprint in theory and practice has paved the way for many scientific researches in this field (Bekiroğlu, 2023). The carbon footprint problem is gradually increasing in transportation, agriculture, tourism, all sectors that require energy use and in sectors related to production activities. The distribution of carbon footprint formation according to sectors and areas can be listed as follows: Industrial 23%, electricity (in state) 11%, Agriculture & forestry 9%, Residential %8, Commercial, 6% and Electricity (import) 5% (California Air Resources Board, 2022). All sectors take responsibility in combating climate change and environmental problems and include sustainability in their planning. Almost all sectors are in a connection with nature and the environment, including the recreation, tourism and sports sectors (Casper and Pfahl, 2012). Steps are being taken to monitor and minimize the carbon footprint in all sectors, especially in tourism. In this process, businesses in all sectors are trying to carry out their activities by taking into account the ISO14064 application. ISO4064 provides a framework for an organization to monitor, reduce and report greenhouse gas emissions. This document helps organizations to improve their environmental performance, increase energy efficiency and take a more sustainable path in the fight against climate change (ISO14064—Greenhouse Gases Package).

2.2. SPA as a recreation, hospitality and tourism service

Based on the fact that it recreates individuals, recreation refreshes the person's ad-venturous and fun activities in his spare time to the extent that he can continue and fulfil his daily duties (Csirmaz and Pető, 2015). Especially, tourism activities can be used as a tool for the development of a community and improving the quality of life (Koščak et al., 2023). Recently, recreation and tourism have been organized together. SPA services have been able to find a place in the understanding of recreation and tourism, especially with the recreation and tourism activities revealing health-related targets. In this way, it can be said that the number and qualifications of employees in tourism and SPA centers as a sub-sector have increased in response to the increasing demand in comprehensive touristic activity areas. Doğru et al. (2023) mention that personnel turnover is quite common in the accommodation and especially the tourism sector.

Today, SPA tourism is the leading touristic recreation activity aiming to improve people's physical and mental health (Anderssen, 2016). Wellness tourism supports the physical, mental and social development of individuals and helps to maintain their health. It also helps to improve socialization and social health (He et al., 2022). SPA centers and facilities are accepted not only for health purposes but also as important socialization venues. In these places where tourism and recreation come together, the

understanding of health and socialization comes together. Therefore, SPA centers are considered as facilities with multiple functions that bring together tourism, health, sports and recreation (Koh et al., 2010).

SPA services have been seen as an important part of entertainment, hospitality, recreation, beauty and wellness and health services, with people giving due importance to health and well-being. However, the SPA sector has grown day by day and has found an important place in the tourism sector (Koskinen and Wilska, 2019). Thanks to SPA centers located closer to the natural environment, beneficiaries can have a different experience by connecting with the natural environment. Thanks to the connection established with the natural environment, it is possible to increase, nourish and enrich social welfare (Choi et al., 2015; Song et al. 2015).

It can be said that a sub-tourism area including health and SPA services is formed within the tourism sector. SPA centers, which are at the forefront of alternative health services, emerge as an area of special interest within the traditional tourism sector. While Csirmaz and Pető (2015) stated that SPA services and facilities are a special interest tourism area within health and well-being tourism.

Today, SPA and related health alternatives are gradually developing depending on the balance of supply and demand. While its effects on human health are revealed, it is also accepted as a growing sector. SPA services, whose economic value is increasing day by day, are considered as one of the most important parts of health tourism (Özdemir, 2015). Therefore, increasing participation and eliminating consumers' worries, concerns and question marks are very important for the growth of the sector. In particular, it may be decisive for business managers to create a safe and healthy business image in this regard. This situation may increase people's service demands (Karagöz et al., 2023).

SPA services are a basic service in wellness tourism, hospitality and constitute an important part of wellness tourism economy. It is stated that the same SPA tourism has a market of 179.7 billion dollars with 224.9 million international and domestic tourists in 2018 (Global Wellness Institute, 2018). Thermal tourism, which has a very wide market all over the world, creates an income of approximately 25-30 billion dollars only in Europe and America. At the same time, it has a large market share in SPA and wellness tourism, such as thermal tourism (Özdemir, 2015).

2.3. Rights the clean environment

The right to a clean environment is perceived as a relationship between a person and the environment, which purpose is to help a person stay in a safe and clean environment. This personal right is one of the basic human rights, arising from other natural human rights (Boyd, 2012; Cima, 2022; Perkumienė, 2020; Rajamani, 2018). The individual's right to a safe, clean and natural environment is guaranteed in both national and international legal documents of most countries. The right of individuals to a clean and safe environment is also regulated in the Universal Declaration of Human Rights (Draft Committee, 1948). The aforementioned declaration enshrines the rights of individuals to a safe, healthy and clean environment. Another important declaration emphasizing the importance of this right of individuals is the Rio Declaration on Environment and Development (Rio Declaration, 1992), which

emphasizes human rights to a 'healthy and fulfilling life in harmony with nature'. The Stockholm Declaration on the Human Environment (United Nations, 1992) also proclaimed the human right to a safe and clean environment. When we are discussing the rights of individuals to a safe and clean environment, should be mentioned the Kyoto Protocol as it plays an important role in the implementation of this right. The purpose of Kyoto Protocol is reducing the greenhouse effect and limiting CO_2 emissions (Kyoto Protocol, 1997).

The Treaty of Amsterdam is also important for the implementation of these rights, the preamble of which establishes stronger environmental protection and the principle of sustainable development (The Treaty of Amsterdam, 1997). The preamble to the Maastricht Treaty declares that member states, 'shall promote the economic and social development of their peoples in order to promote greater cohesion and environmental protection' (Treaty on European Union, 1992). When analyzing international legal documents related with environmental protection and ensuring safe and clean environment, it should mention Aarhus Convention too (Aarhus Convention, 1998) for. The European Court of Justice, in order to protect the fundamental rights of individuals, notes the importance of the international treaties of the member states related to the right to a safe and clean environment. Analysis of legal documents showed that in both Lithuania and Turkey, society's right to a safe environment is guaranteed by the Constitution. Article 54 of the Lithuanian Constitution, ensures the public's right to live in a safe environment (Government of Lithuania, 1992). Article 59 of the Constitution of the Republic of Turkey declares that 'Everyone has the right to live in a healthy and balanced environment. Improving the environment, protecting environ-mental health and preventing environmental pollution is the duty of the state and citizens' (The Government of Turkey, 1982).

It should be noted that the practice of the European Court of Human Rights analyses problematic issues related to the right of individuals to a healthy, clean and safe environment, taking into account the human right to private life, the right to life, freedom of religion, etc. In their practice, courts are also faced with noise, pollution, smells, etc. factors that affect people's well-being or even pose a direct threat to human health, in cases (Mazilu, 2008). The right to a safe and clean environment can be called a public right and it can be emphasized that it is directly related to the right to health protection. The right to health protection is enshrined in the primary legal sources of the European Union.

The Treaty on the Functioning of the European Union sets out the task of comprehensive and assured protection of environmental seeking the improvement the quality of the environment. A high level of environmental protection must be maintained by preventing any activities that cause environmental damage or may cause damage in the future (Cima, 2022; Dogaru, 2014).

3. Materials and methods

3.1. Research methodology

The purpose and scope of the calculation of the carbon footprint based on the energy consumption of 20 SPA centers located in different cities in Turkey and Lithuania includes a comprehensive assessment of the environmental impacts

associated with the energy use of these facilities. The main objective is to quantify the total greenhouse gas emissions resulting from the energy consumption of each SPA center, specifically in terms of carbon dioxide equivalent (CO_2eq). This assessment aims to provide insight into the environmental sustainability of SPA operations in different geographical locations, taking into account differences in energy sources, consumption patterns and regional energy profiles Life cycle inventory provides the necessary framework and data to understand the environmental implications of energy use at different stages of the spa centers' life cycle, facilitating a more informed and comprehensive sustainability assessment. Conducting an environmental impact assessment for spa facilities in different countries is essential for promoting environmentally sustainable practices, ensuring compliance with regulations, and contributing to the overall well-being of ecosystems and communities.

This research, which is based on quantitative research methodology within the scope of social sciences, was carried out on a numerical basis. Electricity, natural gas and water consumption amounts consumed during 2022 in SPA centers located in different cities in Turkey and Lithuania were used as a data set. In order to find an answer to the research question that is the subject of the study, a methodology for the calculation of carbon dioxide emissions has been put forward by the Intergovernmental Panel on Climate Change (IPCC). Within the scope of this methodology, carbon footprint calculations of SPA facilities were carried out.

Carbon footprint calculations are basically made under three headings. IPCC has divided them into three under the title of Tier (Binboğa and Ünal, 2018). While the first title has the opportunity to analyze with less data, the other 2 titles require more complicated and detailed data (Atabey, 2013). Therefore, in this study, carbon footprint measurements and calculations based on energy and natural resource consumption (electricity, natural gas and water) of a total of 20 SPA centers in Turkey and Lithuania were carried out.

3.2. Limitation of study

This research is limited to Turkey and Lithuania. Along with summer tourism, the importance of health and recreation tourism is gradually increasing in Turkey. In this context, 10 SPA centers located in different provinces of Turkey and 10 SPA centers located in different cities in Lithuania, 20 SPA centers from both countries in total were included in the scope of the research. The data provided from by Turkey and Lithuanian researchers provide the opportunity to conduct a comparative study. It is expected that this study, which is limited to only two countries, will lead to a more comprehensive and well-attended sample group from now on.

3.3. Data collection process

The data set used in the research was taken from a total of 20 SPA centers located in different cities in Turkey and Lithuania. Electricity, natural gas and water consumption amounts consumed during 2022 in SPA centers included in the research are included in the carbon footprint calculation. 10 SPA centers from Turkey; 10 SPA centers were randomly selected from Lithuania. In accordance with the ethical principles of scientific publication and data protection principles, no definition has

been made regarding the SPA centers where the data used in the research were obtained. Information about all names and institutions is kept confidential by the researchers. The digitized research data are visualized and presented in the **Table 1** below:

Table 1. Amounts of energy and water consumption of SPA centers in Turkey and Lithuania in 2022.

Country	Electricity Consumption (kWh)	Natural Gas Consumption (m^3)	Water Consumption (m^3)
Turkey	9,815,640	46,4647	108,394
Lithuania	11,284,543	417,386	117,678
Total	21,100,183	882,033	226,072

It can be said that amounts of the energy and water consumption of the SPA centers in Turkey and Lithuania are close to each other. These values may vary according to the intensity of use. Within the scope of the research, only the consumption amounts for the year 2022 were included in the research. Along with the intensity of use, the climatic and seasonal conditions in both countries can affect especially electricity and natural gas consumption. The basic characteristics and information of 20 SPA centers from both countries included in the carbon footprint calculations within the scope of the research are presented in **Table 2** below.

Table 2. Characteristics of SPA centers within the scope of the research and services offered.

Country	Average square (m^2)	Average Daily Users	Services Offered
Turkey	5750 m^2	940	Massage, body care, sauna, yoga, skin care, Jacuzzi, fitness, hammam
Lithuania	6450 m^2	1075	
Total	12,200 m^2	2015	

The characteristics of the 20 SPA centers included in the study from both countries are presented in the table above. Accordingly, it is understood that the square meters of the SPA centers in Lithuania are larger and the number of users is higher compared to Turkey. However, it can be said that the services offered in the centers in both countries are similar and address basic human needs such as massage, body care and sauna. In addition, it is seen that health and personal care needs are also met in these centers.

3.4. Data analysis process

Tier 1 model was used in the analysis of the data obtained from 20 SPA centers. The Tier 1 model includes the calculation of emissions to the atmosphere in relation to the consumption of electricity, natural gas and water purchased and consumed in SPA centers. These indirect emissions are a result of energy use in SPA centers. Electricity, natural gas and water consumption data of a total of 20 SPA centers from both countries were obtained. Then, carbon footprint calculations were carried out separately depending on each consumption head (electricity, natural gas and water).

In the first step of the data analysis process, the carbon footprint of the SPA centers in the two countries was calculated based on their electricity consumption. For this, carbon emission factors prepared by the United Kingdom for the European Union

countries (GOV.UK., 2023) were used. The accepted emission factor is 0.19338 kg/kWh. this factor d calculation value was used and the carbon footprint obtained by multiplying this value directly by the amount of electricity consumption was calculated in kg. In order to present the calculation more clearly and to be more understandable, the calculated carbon footprint is also presented in ton. The formula used in the calculation is given below:

$$Amount\ of\ Electricity\ Used \times 0.19338\ \text{kg/kWh} = CF$$

The second step of the calculation is the calculation of the footprint caused by natural gas consumption. In this process, the natural gas emission value provided by the United Kingdom was utilized. 2.01193 kg/m³ calculation value was used for the carbon footprint, which is obtained by multiplying this value with the amount of direct natural gas consumption, is calculated in kg. In order to present the calculation more clearly and to be more understandable, the calculated carbon footprint is also presented in ton. The formula used in the calculation is given below:

$$Amount\ of\ Natural\ Gas\ Used \times 2,01193\ \text{kg/m}^3 = CF$$

In the last step, In the footprint calculation based on the amount of water consumed in SPA centers and facilities. Since the UK Greenhouse Gas Conversion factors are used by the IPCC in carbon footprint calculations, emission factors related to water consumption were used in the calculation process in this study (GOV.UK., 2023), and each 1, 05234 kg/m³ calculation value was used for the unit. The carbon footprint, which is obtained by multiplying this value with the amount of direct water consumption, is calculated in kg. In order to present the calculation more clearly and to be more understandable, the calculated carbon footprint is also presented in ton. The formula used in the calculation is given below:

$$Amount\ of\ Water\ Used \times 1,05234\ \text{kg/m}^3 = CF$$

Using the data on electricity, natural gas and water consumption included in the research, calculations were made based on the IPCC carbon dioxide emission factors set forth above and carbon footprint calculations of the SPA facilities were made. In the carbon footprint calculation, firstly, calculations were made according to the energy type for each country, and then the total carbon footprint calculation was made for both countries.

4. Results and discussion

In this part of the study, the carbon footprint findings calculated based on the energy (electricity and natural gas) and natural resource (water) consumption in 20 SPA facilities located in different cities in Turkey and Lithuania in 2022 are presented.

While the carbon footprint due to electricity consumption used in 10 SPA centers located in different provinces in Turkey is calculated as 1898.15 ton, the carbon footprint due to natural gas consumption is 934.84 ton and the carbon footprint due to water consumption is 114.07 ton. The total carbon footprint for 2022 is calculated as 2947.06 ton. In Lithuania, the carbon footprint due to electricity consumption used in 10 SPA centers located in different provinces is calculated as 2182.20 ton, the carbon footprint due to natural gas consumption is 839.75 ton and the carbon footprint due to water consumption is 123.84 ton. The total carbon footprint for 2022 is calculated as

3145.79 ton. In total, the carbon footprint of 20 SPA centers in both countries was calculated as 6092.85 ton. The total carbon footprint calculated for both countries is presented in the **Table 3** and also **Figure 2** below.

Table 3. Carbon footprint of SPA centers in Turkey and Lithuania in 2022.

	Energy type	**Amounts of consumption**	**CF (kg)**	**CF (Tones)**	**Total CF (Tones)**
Turkey	Electricity	9,815,640 (kWh)	1,898,148,46	1,898,15	
	Natural Gas	464,647 m³	934,837,24	934,84	2,947,06
	Water	108,394 m³	114,067,34	114,07	
Lithuania	Electricity	11,284,543 (kWh)	2,182,204,92	2,182,20	
	Natural Gas	417,386 m³	839,751,41	839,75	3,145,79
	Water	117,678 m³	123,837,27	123,84	
Total Carbon Footprint (CF)	-	-	-	-	6,092,85

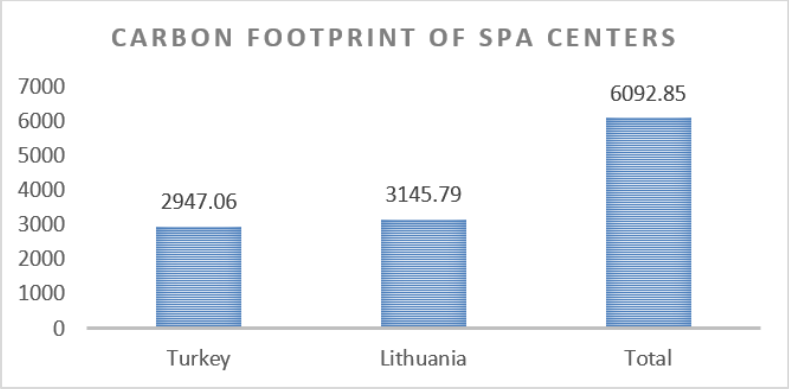

Figure 2. Total carbon footprint calculated for Turkey and Lithuania.

While the total carbon footprint of 20 SPA centers in Turkey and Lithuania is calculated as 6092.85 ton, the carbon footprint calculated for Turkey is 2947.06 ton; The carbon footprint calculated for Lithuania is 3145.79 ton. It is seen that the carbon footprint values of both countries are close to each other, both on a country basis and in total.

5. Discussion

Depending on the intensity of use, the amount of energy and water consumed in SPA centers may vary. The above calculation is based on data for 2022 only. Especially since there is no research that reveals the carbon footprint of SPA centers, the research findings are discussed in relation to carbon footprint studies related to energy consumption in the light of general literature.

While the annual carbon footprint related to electricity, natural gas and water consumption used in 10 SPA centers located in different provinces in Turkey is calculated as 2947.06 ton; In Lithuania, the carbon footprint related to electricity, natural gas and water consumption of 10 SPA centers in the same period was calculated as 3145.79 ton. In total, the carbon footprint of 20 SPA centers in both countries was calculated as 6092.85 ton. Research findings show that the carbon

footprints of the SPA centers in both countries are close to each other. This can be explained by the fact that the amounts of electricity, natural gas and water used in SPA centers in Turkey and Lithuania are close to each other. Especially, when evaluated specifically in Turkey, it is known that legal practices regarding the protection of the environment are insufficient. Only the legal legislation of local governments includes tax collection for environmental protection, but the amount of this tax is quite low. This situation may cause electricity consumption to increase throughout the country (Işık and Radulescu, 2017).

The carbon footprint problem is an important part of the global climate change problem, and a significant part of it is known as greenhouse gas emissions from corporate organizations and is currently a threat to humanity (Aroonsrimorakot et al., 2013). Global warming and environmental problems are attracting attention on a global scale as the climate change problem gains momentum and increases concerns. For this reason, international initiatives are emerging, especially to reduce carbon emissions. It focuses especially on combating climate change with the Kyoto Protocol and Paris Agreements (Doğru et al., 2020).

The fact that the SPA centers in both countries, which are the subject of the research, meet their energy needs from fossil sources, increases the environmental impact risks. Especially fossil fuel sources can be considered as a part of the global climate change problem due to their high emission content. Today, almost all of the developed or developing countries meet their energy needs from fossil fuel sources (Caetano et al., 2017; Sugiawan and Managi, 2019). Although clean energy efforts are increasing, many countries still have to meet their energy needs from fossil resources and their use is still widespread (Khan et al., 2016; Zheng et al., 2015). However, while it is known that fossil fuel sources produce negative environmental impacts, this situation is also addressed by many different scientific studies. It is known that they not only cause environmental problems but also negatively affect people's health and quality of life. Especially with air pollution, it can be said that human life is at risk with different dimensions (Li et al., 2017; Melissa et al., 2017; Zhang et al., 2018). In the research conducted by Doğru et al., (2020), it was concluded that negative environmental impacts due to carbon dioxide emissions increased due to the development of tourism in countries such as Canada and the Czech Republic, including Turkey.

The fact that electricity energy and natural gas needs are met especially from fossil fuel sources poses a significant risk. Because carbon emissions from electricity consumption account for most of the total greenhouse gas emissions (Goliopoulos et al., 2022). As stated above, fossil fuel resources, which are shown as the source of many environmental problems, primarily air pollution, are today recognised as the main cause of carbon footprint (Chard and Mallen, 2013). According to the carbon footprint measurements of Mahidol University Faculty of Environmental and Resource Studies carried out by Aroonsrimorakot et al. (2013) carbon emissions caused by human activities were calculated as 1091.85 ton CO_2. It has been concluded that the most important share in the resulting carbon emission is due to electricity consumption Also, Kim et al. (2013), it was concluded that the percentage of carbon emissions due to electricity consumption varies between 5.2% and 18.6%, while the percentage of carbon emissions due to water use varies between 4.0% and 11.6%

across Australia. In another study by Letete et al. (2011), they calculated the carbon footprint for the University of Cape Town. Parameters such as campus energy consumption, transportation, goods and additive services were used in the calculation. In the calculations, they determined that the carbon footprint of the university is 83,400 tCO_2eq and 80% of this amount is due to electricity consumption.

Along with electricity consumption, natural gas consumption, which is also one of the fossil fuel sources, is also intense due to the content of the services offered in the SPA centers in both countries. Natural Gas is also supplied from fossil sources such as electricity and is an important source of carbon footprint. The main reasons for the formation of carbon footprints in all processes are the use of natural gas, coal and diesel (Coşkun and Doğan, 2021). Energy sources such as hydrocarbons, natural gas, oil and water are at the forefront of the causes of climate change caused by greenhouse gases, and greenhouse gases cause the world's carbon holding capacity to decrease, and natural gas used for heating is considered the most important carbon footprint source (Birkan, 2012; Kumaş et al., 2019).

Pollution and environmental problems caused by natural gas are serious problems that affect human health and the environment itself. Natural gas consumption, which is one of the leading fossil resources, increases the concerns about climate change, while the problems related to global warming are increasing (Zárante and Sodré, 2009). It is widely accepted that, if necessary, measures are not taken to reduce climate change problems, especially carbon footprints, it can be said that the planet we live on may be heading towards an environmental catastrophe due to the intense negative environmental impacts (Adamantiades and Kessides, 2009; Menyah and Wolde-Rufael, 2010; Reddy and Assenza, 2009). Carbon emissions resulting from the intense use of natural gas, one of the leading fossil fuels, are considered to be the main cause of climate change problems (Hansen and Sato, 2016; Wang and Li, 2016a, 2016b).

Within the scope of this study conducted in SPA centers, it is seen that there is intense water consumption in the SPA centers in both countries. SPA centers are facilities where water consumption is intense due to the services they offer. But the carbon footprint associated with water use is likely increasing for a number of reasons. Climate change is predicted to have multiple adverse effects on freshwater resources and will make many existing water resources much less reliable. With increasing water demand and many local, low-energy sources already being pulled from the tap, water providers are increasingly seeking alternative water sources that are more distant or that often cost much more energy and carbon than existing sources (Griffiths-Sattenspiel and Wilson, 2009). However, due to the crisis of global energy and water resources (Van Fan et al., 2021), sustainable development involving the environment and society has become a hot topic (Song, 2021; Wang et al., 2022). In addition, with urbanization, human activities are increasing and consumption is accelerating (Zhang et al., 2019). In this context, the understanding of sustainable tourism has found its response in theory and practice in recent years. The most important part of this process is the planning of participant activities so that realistic steps can be taken for sustainable tourism goals (Koščak et al., 2023).

These research results, in which the problem of climate change and carbon footprint are handled only in SPA centers, can be considered as a sign of important environmental problems. As a matter of fact, our planet continues to stand on the brink

of a climate change crisis. Human-based activities are affecting the global warming problem more and each passing day, so, reducing greenhouse and carbon gas emissions serves to build a more habitable planet and sustainable environment. At the same time, it is necessary to avoid irreparable losses and damages (Steffen et al., 2018). For this, it can be aimed to invest in renewable energy resources and reduce environmental problems with developing technologies (Hernanadez and Renard, 2015). The conversion and trend from fossil fuel sources to renewable energy reduces carbon dioxide emissions. In addition, reducing environmental protection costs can be considered as an opportunity to create less time, money and resource costs (Işık et al., 2023). As stated above, fossil fuel sources can cause high levels of carbon emissions. However, it is quite possible to reduce these carbon emissions through the spread of clean and environmentally friendly energies, policies and practices (Işık et al. 2020; Işık et al., 2021; Işık et al., 2022). In addition, the widespread use of clean and renewable energy by moving away from fossil fuels can help solve the problems of global warming and climate change (Buonocore et al., 2016; Plachinski et al., 2014).

6. Conclusion

The interest in SPA centers has increased with people's under-standing of alternative health. SPA services, where tourism and recreation come together with health-related expectations, are becoming increasingly widespread and diversifying service alternatives. Increasing interest and advances in the SPA sector also bring about environmental problems. Due to the nature of the services offered in SPA centers, there is an intense consumption of electricity, natural gas and water. Meeting the electricity and natural gas needs from fossil sources and using clean water sources reveal the carbon footprint of SPA centers and this footprint is growing day by day. The growing carbon footprint represents part of the global climate change problem. In this research, in which the carbon footprints of 20 SPA centers located in different cities in Turkey and Lithuania were calculated, the following results were obtained:

While the carbon footprint due to electricity consumption used in 10 SPA centers located in different provinces in Turkey is calculated as 1898.15 ton, the carbon footprint due to natural gas consumption is 934.84 ton and the carbon footprint due to water consumption is 114.07 ton. The total carbon footprint for 2022 is calculated as 2947.06 ton. In Lithuania, the carbon footprint due to electricity consumption used in 10 SPA centers located in different provinces is calculated as 2182.20 ton, the carbon footprint due to natural gas consumption is 839.75 ton and the carbon footprint due to water consumption is 123.84 ton. The total carbon footprint for 2022 is calculated as 3145.79 ton. In total, the carbon footprint of 20 SPA centers in both countries was calculated as 6092.85 ton.

This research, which is limited to Turkey and Lithuania, focused on SPA centers that are part of the carbon footprint problem. It has been understood that especially fossil fuel sources are used in SPA centers in the countries subject to the research. Preferring renewable energy sources instead of fossil sources can contribute to the solution of the climate change problem. Due to the nature of SPA centers, intense energy consumption continues throughout the year. Therefore, it is very important to choose energy systems that are environmentally friendly and whose carbon footprint

can be minimized. However, instead of clean water sources, it may be possible to protect spring waters by constructing rainwater harvesting systems in centers. In addition, the use of clean water resources can be avoided by installing water treatment systems.

To minimize the carbon footprint in SPA centers in Turkey and Lithuania, adopting sustainable practices is crucial. Implementing energy-efficient technologies, such as light emitting diode (LED) lighting and smart heating, ventilation and air conditioning (HVAC) systems, can significantly reduce energy consumption. Utilizing renewable energy sources, like solar panels, can further contribute to a greener operation. Encouraging the use of eco-friendly and biodegradable products minimizes environmental impact. Water conservation measures, such as installing water-efficient fixtures and promoting responsible water usage, are essential. Designing and constructing SPA centers with eco-friendly materials align with green building practices. Promoting education initiatives about environmental responsibility, fosters awareness. Building partnerships with suppliers adhering to sustainable practices and obtaining relevant certifications showcase a commitment to reducing the carbon footprint. Regular monitoring and reporting ensure ongoing environmental accountability, fostering a holistic approach to sustainability in SPA centers.

SPA centers, where health, tourism and recreation services are offered together, are centers where human mobility and energy use are inevitable due to their year-round use potential. It is very important to prefer clean energy sources for sustainable environment, health, tourism and recreation and to avoid using clean water resources.

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